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EXAMINER	
LEUNG, CHRISTINA Y	
ART UNIT	**PAPER NUMBER**
2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/051,334	TURPIN ET AL.	
	Examiner	Art Unit	
	Christina Y. Leung	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 22 January 2002.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☒ Claim(s) 17 and 22 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 January 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 1-22-02, 7-17-03.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 17 and 22 are objected to because of the following informalities:

Claim 17 recites "at least one an add wavelength" (sic) in line 8 of the claim. Examiner respectfully suggests that Applicants remove the word "an" from this phrase for grammatical reasons.

Examiner also respectfully suggests that Applicants add the word "to" before the phrase "select and recombine" in line 2 of claim 22 for grammatical reasons.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7, 9-16, 18, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki (US 5,999,320 A) in view of Kessler et al. (US 6,434,291 B1).

Regarding claim 1, Shirasaki discloses a system (Figure 14) comprising:

a processor (including wavelength splitter 148 and lens 160; the wavelength splitter is also shown in detail as element 76 in Figures 6 and 7) to process at least one collimated input beam to produce multiple time-delayed output beams, the input beam comprising at least one frequency, the multiple time-delayed output beams being mutually phase-shifted as a function of the at least one frequency of the input beam and being spatially distributed, whereby the at least

one input beam is channelized into constituent frequencies (column 5, lines 35-67; column 6, lines 1-25; column 7, lines 11-19; column 12, lines 31-64).

Shirasaki does not specifically further disclose a subsystem to drop or add at least one wavelength.

However, Kessler et al. teach a system related to the one disclosed by Shirasaki including an input beam (from fiber 110) channelized into spatially distributed constituent frequencies (Figure 1; column 4, lines 39-47). Kessler et al. further teach a subsystem (including spatial light modulator 150) to drop at least one wavelength from the at least one collimated input beam or to add at least one wavelength to the collimated input beam after the at least one input beam has been channelized (column 4, lines 52-55). It would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as taught by Kessler et al. in the system disclosed by Shirasaki in order to add and drop wavelengths in the optical communications system and thereby direct various signals to and from their respective users. One in the art would have been particularly motivated to combine the particular subsystem taught by Kessler et al. in order to implement adding and dropping of signals quickly and efficiently completely within the optical domain.

Regarding claim 4 in particular, Kessler et al. further teach that the subsystem comprises a port (such as the input/output port to which fiber 110 is connected in Figure 2, or ports connected to fibers 110 and 390 at either end of the embodiment shown in Figure 3) where light is selectively passed or reflected (each element in spatial light modulator 150 selectively passes or reflects light; column 5, lines 22-25).

Regarding claim 6 in particular, Kessler et al. further teach a fiber 390 in Figure 3 coupled to a target wavelength passed through the port; and

an optical device (such as a circulator) coupled to the fiber to receive the target wavelength passed through the port and to pass the target wavelength on another fiber optic path (Kessler et al. specifically teach that a circulator may be connected to fiber 390, although one is not explicitly in the figure; column 6, lines 22-24).

Regarding claim 5 in particular, Kessler et al. further teach a mirror having at least one hole located at a same spatial location as a spatial location corresponding to a target wavelength to be dropped. The spatial light modulator they teach may be considered a mirror having holes, whereby the reflective individual SLM elements form a mirror while the transmissive individual elements are holes (column 5, lines 22-25).

Regarding claim 9 in particular, Kessler et al. further teach that the subsystem may comprise a micro-electromechanical system having a plurality of micro-mirrors each positioned at a spatial location corresponding to a spatial location of the channelized input beam. Examiner notes that Kessler et al. teach that the spatial light modulator 150 may comprise individual mirror elements corresponding to spatial locations of the channelized beam (column 5, lines 22-34) and also teach that the system may include additional micro-mirrors 470 (Figure 4; column 6, lines 34-45).

Regarding claim 10 in particular, Kessler et al. further teach that at least one of the micro-mirrors is canted at an angle to reflect at least one target wavelength to an optical device (such as lens 480).

Regarding claim 11 in particular, Kessler et al. further teach that an optical signal to be added is coupled to the target wavelength at the optical device (as an incoming signal through a fiber 270 and lens 480; column 6, lines 43-45). Examiner notes that the term “optical device,” as recited in claims 10 and 11 without further details, may refer to a variety of elements in the optical art. Since claims 10 and 11 do not depend on claim 6, the “optical device” as discussed with regard to claims 10 and 11 does not necessarily have to be the same element as discussed above with respect to claim 6.

Regarding claims 4-6 and 9-11, again, it would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as taught by Kessler et al. in the system disclosed by Shirasaki in order to add and drop wavelengths in the optical communications system and thereby direct various signals to and from their respective users. One in the art would have been particularly motivated to combine the particular subsystem taught by Kessler et al. in order to implement adding and dropping of signals quickly and efficiently completely within the optical domain.

Regarding claim 2, Shirasaki further discloses that the processor comprises:

a first reflective surface 152 (on wavelength splitter 148 in Figure 14), and a second reflective surface 154, the second reflective surface having a reflectivity of less than 100% (column 12, lines 50-51), the first reflective surface and the second reflective surface being in spaced relationship,

whereby at least a portion of a beam directed toward the second surface is reflected multiple times between the first and second surfaces, thereby producing multiple time-delayed

output beams exiting the second surface (see Figures 7-9; column 5, lines 59-67; column 6, lines 1-67; column 7, lines 1-19).

Regarding claim 3, Shirasaki discloses an optical system (lens 160) to operate on the multiple time-delayed output beams exiting the second surface 154 to channelize the at least one input beam into constituent frequencies (such as beams 158a-c shown in Figure 14; column 12, lines 55-63).

Regarding claim 7, Shiragaki in view Kessler et al. describe a system as discussed above with regard to claims 1 and 4. Shiragaki further discloses a detector 118 to receive a target wavelength to convert the target wavelength to an electronic signal (Figure 11; column 11, lines 5-7).

Regarding claim 12, as similarly discussed above with regard to claim 1, Shirasaki disclose a method (Figure 14) comprising:

providing at least one collimated input beam (via collimating lens 142, for example), the at least one input beam comprising at least one frequency;

processing the at least one input beam to produce multiple time-delayed output beams mutually phase-shifted as a function of the at least one frequency of the input beam and being spatially distributed, whereby the at least one input beam is channelized into constituent frequencies (using wavelength selector 148 and lens 160; column 5, lines 35-67; column 6, lines 1-25; column 7, lines 11-19; column 12, lines 31-64).

Shirasaki do not specifically disclose adding or dropping at least one wavelength.

However, Kessler et al. teach a system related to the one disclosed by Shirasaki including an input beam (from fiber 110) channelized into spatially distributed constituent frequencies

(Figure 1; column 4, lines 39-47). Kessler et al. further teach a subsystem (including spatial light modulator 150) to drop at least one wavelength from the at least one collimated input beam or to add at least one wavelength to the collimated input beam after the at least one input beam has been channelized (column 4, lines 52-55). Again, it would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as taught by Kessler et al. in the system disclosed by Shirasaki in order to add and drop wavelengths in the optical communications system and thereby direct various signals to and from their respective users. One in the art would have been particularly motivated to combine the particular subsystem taught by Kessler et al. in order to implement adding and dropping of signals quickly and efficiently completely within the optical domain.

Regarding claim 13, Shirasaki discloses providing a first reflective surface 152, providing a second reflective surface 154, the second reflective surface having a reflectivity of less than 100% (column 12, lines 50-51), and positioning the first reflective surface and the second reflective surface so that at least a portion of a beam directed toward the second surface is reflected multiple times between the first and second surfaces, thereby producing multiple time-delayed output beams exiting the second surface (see Figures 7-9; column 5, lines 59-67; column 6, lines 1-67; column 7, lines 1-19).

Regarding claim 14, Shirasaki discloses operating (using lens 160) on the multiple time-delayed output beams exiting the second surface 154 to channelize the at least one input beam into constituent frequencies (such as beams 158a-c shown in Figure 14; column 12, lines 55-63).

Regarding claims 15 and 16 in particular, Kessler et al. further teach that the dropping comprises:

providing a port (such as the port to which fiber 390 is coupled in Figure 3) where light is selectively passed or reflected, wherein separated wavelengths from the input beams pass through the port;

collecting each wavelength passing through the port by a coupled fiber 390; and

passing the collected wavelengths through a combining/separating device comprising a circulator for separating or combining a bi-directionally propagating light beam into separate unidirectionally propagating light beams (a circulator is not explicitly shown in Figure 3, but Kessler et al. teach one may be coupled to fiber 110 or 390; column 6, lines 21-24).

Although Kessler et al. do not explicitly teach a drop fiber attached to this circulator, it would have been obvious to a person of ordinary skill in the art to continue to pass the dropped wavelengths from the circulator to a fiber simply in order to continue to transmit the wavelengths further in the system. It would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as suggested by Kessler et al. in the system disclosed by Shirasaki in order to drop wavelengths in the optical communications system and thereby direct various signals to respective users.

Regarding claim 18, Kessler et al. further teach that the dropping (as shown in Figure 3, for example) comprises:

providing a first port (the port to which fiber 110 is coupled in Figure 3) where light is selectively passed or reflected (using the spatial light modulator elements 150), wherein separated wavelengths from the input beams pass through the first port;

passing the wavelengths which do not pass through the first port to a second port (the port to which fiber 390 is coupled); and

passing the each wavelength which passes through the first port to a drop fiber (i.e., fiber 110).

Regarding claim 21, Kessler et al. further teach that the dropping (as shown in Figure 3, for example) comprises:

providing a linear array of micro-mirrors 150, each positioned at a spatial location corresponding to a spatial location of the channelized input beam;

receiving, at the plurality of micro-mirrors, all channelized input beams; and

rotating the micro-mirror corresponding to the targeted wavelength to be dropped to reflect the targeted wavelength to an optical system (such as a circulator not explicitly shown in Figure 3, but Kessler et al. teach one may be coupled to fiber 110 or 390; column 6, lines 21-24).

Although Kessler et al. do not explicitly teach a drop fiber attached to this circulator, it would have been obvious to a person of ordinary skill in the art to continue to pass the dropped wavelengths from the circulator to a fiber simply in order to continue to transmit the wavelengths further in the system.

Examiner notes that Kessler et al. teach that the spatial light modulator 150 may comprise individual mirror elements corresponding to spatial locations of the channelized beam (column 5, lines 22-34) and also teach that the system may include additional micro-mirrors 470 (Figure 4; column 6, lines 34-45).

Regarding both claims 18 and 21, again, it would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as suggested by Kessler et al. in the system disclosed by Shirasaki in order to drop wavelengths in the optical communications system and thereby direct various signals to respective users.

Regarding claim 22, as similarly discussed above with regard to claim 1, Shirasaki discloses a system (Figure 14) comprising a demultiplexing/multiplexing subsystem (including wavelength splitter 148 and lens 160) to select and recombine an appropriate wavelength wherein the demultiplexing/multiplexing subsystem channelizes a plurality of discrete input beams into their constituent frequency components at independent spatial locations without using gratings or filters (column 5, lines 35-67; column 6, lines 1-25; column 7, lines 11-19; column 12, lines 31-64).

Shirasaki does not specifically disclose that the system further includes an add/drop apparatus, but as already discussed, Kessler et al. teach a related system including means for channelizing a plurality of discrete input beams into their constituent frequency components at independent spatial locations. Kessler et al. further teach an add/drop apparatus (including spatial light modulator 150) to route the wavelength to a desired optical fiber output (column 4, lines 52-55), wherein the add/drop apparatus can add or drop multiple wavelengths from multiple channels with separations between 50 MHz and 25 GHz (column 5, lines 7-55) without using gratings or filters (although Kessler et al. refer to gratings in other parts of their system, the add/drop apparatus they teach, spatial light modulator 150, may comprise mirrors or other embodiments that do not use gratings or filters; column 5, lines 22-34).

It would have been obvious to a person of ordinary skill in the art to include the subsystem with various structures as taught by Kessler et al. in the system disclosed by Shirasaki in order to add and drop wavelengths in the optical communications system and thereby direct various signals to and from their respective users. One in the art would have been particularly

motivated to combine the particular subsystem taught by Kessler et al. in order to implement adding and dropping of signals quickly and efficiently completely within the optical domain.

4. Claims 8, 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Kessler et al. as applied to claims 6 or 12 respectively above, and further in view of Taga et al. (US 5,822,095 A).

Regarding claim 8, Shirasaki in view of Kessler et al. describe a system as discussed above with regard to claims 1, 4, and 6. Kessler et al. teaches that an optical device such as a circulator may be connected to the fiber 390 in Figure 3 (column 6, lines 21-24), but neither Shirasaki in view of Kessler et al. specifically suggest an optical signal to be added coupled to a target wavelength at this optical device.

However, Taga et al. teach a system (Figure 3) related to the one described by Shirasaki in view of Kessler et al including means (element 4) for passing or dropping wavelengths from a multiplexed signal by selectively reflecting them and an optical device comprising a circulator 8 through which a dropped target wavelength passes (to fiber 6). Taga et al. further teach that an optical signal to be added is coupled to a target wavelength at the optical device (from fiber 7) and the coupled wavelength passes back through the system and eventually output on an optical fiber (fiber 2; column 3, lines 46-67; column 4, lines 1-15).

It would have been obvious to a person of ordinary skill in the art to further include the circulator as taught by Taga et al. to the system suggested by Shirasaki in view of Kessler et al. in order to provide a way to add wavelengths to replace the dropped ones and thereby continue to use those wavelengths to transmit data in the communications system. Shirasaki in view of Kessler et al. already suggest providing adding functions and including circulators in general.

Regarding claims 17, 19, and 20, Shirasaki in view of Kessler et al. describe a method as discussed above with regard to claim 12 including adding and dropping wavelengths.

Regarding claim 17, Kessler et al. further teach that the adding comprises:

providing a port (such as the port to which fiber 390 is coupled in Figure 3) where light is selectively passed or reflected, wherein separated wavelengths from the input beams pass through the port;

collecting each wavelength passing through the port by a coupled fiber 390;

passing the collected wavelengths through a combining/separating device for separating or combining a bi-directionally propagating light beam into separate unidirectionally propagating light beams (a circulator is not explicitly shown in Figure 3, but Kessler et al. teach one may be coupled to fiber 390; column 6, lines 21-24).

Kessler et al. do not specifically teach that added wavelengths may be coupled to the combining/separating device.

However, Taga et al. teach a method (Figure 3) related to the one described by Shirasaki in view of Kessler et al including passing or dropping wavelengths from a multiplexed signal by selectively reflecting them and passing wavelengths through a combining/separating device (circulator 8). Taga et al. further teach coupling at least one added wavelength (from fiber 7) at the combining/separating device, wherein the coupled wavelength passes back through the system and eventually output on an optical fiber (fiber 2; column 3, lines 46-67; column 4, lines 1-15).

It would have been obvious to a person of ordinary skill in the art to further include adding wavelengths by coupling them to a combining/separating device as taught by Taga et al.

to the system suggested by Shirasaki in view of Kessler et al. in order to provide a way to add wavelengths to replace the dropped ones and thereby continue to use those wavelengths to transmit data in the communications system. Shirasaki in view of Kessler et al. already suggest providing adding functions and including circulators in general.

Regarding claim 19, Kessler et al. further teach that the adding comprises:

providing a first port (such as the port to which fiber 390 is coupled in Figure 3) where light is selectively passed or reflected, wherein separated wavelengths from the input beams pass through the first port; and

reflecting all wavelengths not passed through the first port to a second port (the port to which fiber 110 is coupled in Figure 3) where light is selectively passed or reflected.

Kessler et al. do not specifically teach receiving added signals at the second port.

However, Taga et al. teach a method (Figure 3) related to the one described by Shirasaki in view of Kessler et al including passing or dropping wavelengths from a multiplexed signal by selectively reflecting them. Taga et al. further teach receiving an added signal (i.e., $\lambda 1$ from fiber 7 in Figure 3) and combining it to one of the wavelengths that has not been passed (column 3, lines 46-67; column 4, lines 1-15).

It would have been obvious to a person of ordinary skill in the art to further include adding wavelengths as taught by Taga et al. to the system suggested by Shirasaki in view of Kessler et al. in order to provide a way to add wavelengths to replace the dropped ones and thereby continue to use those wavelengths to transmit data in the communications system. Shirasaki in view of Kessler et al. already suggest providing adding functions and including circulators in general.

Regarding claim 20, Kessler et al. teach that the adding comprises:

providing a linear array of micro-mirrors 150, each positioned at a spatial location corresponding to a spatial location of the channelized input beam;

receiving, at the plurality of micro-mirrors, all channelized input beams;

rotating the micro-mirror corresponding to the targeted wavelength to reflect the targeted wavelength to an optical system (such as a circulator not explicitly shown in Figure 3, but Kessler et al. teach one may be coupled to fiber 110 or 390; column 6, lines 21-24).

Examiner notes that Kessler et al. teach that the spatial light modulator 150 may comprise individual mirror elements corresponding to spatial locations of the channelized beam (column 5, lines 22-34) and also teach that the system may include additional micro-mirrors 470 (Figure 4; column 6, lines 34-45).

Again, Kessler et al. do not specifically teach coupling an added wavelength to the optical system. However, Taga et al. teach a method (Figure 3) related to the one described by Shirasaki in view of Kessler et al including passing or dropping wavelengths from a multiplexed signal by selectively reflecting them. Taga et al. further teach coupling at least one added wavelength (from fiber 7) at an optical system comprising a circulator, wherein the coupled wavelength passes back through the system and eventually output on an optical fiber (fiber 2; column 3, lines 46-67; column 4, lines 1-15).

It would have been obvious to a person of ordinary skill in the art to further include adding wavelengths by coupling them to optical system as taught by Taga et al. to the system suggested by Shirasaki in view of Kessler et al. in order to provide a way to add wavelengths to replace the dropped ones and thereby continue to use those wavelengths to transmit data in the

communications system. Shirasaki in view of Kessler et al. already suggest providing adding functions and including circulators in general.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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